Math 31
Aug. 1969

EDUCATION LIBRARY
UNIVERSITY OF ALBERTA

HIGH SCHOOL AND UNIVERSITY MATRICULATION EXAMINATIONS BOARD

DEPARTMENTAL EXAMINATIONS, 1969
AUGUST

MATHEMATICS 31 (NEW)

Time — 2 hours.

Total Possible Mark — Sections A and B - 106, Sections A and C - 110.

DO NOT SPEND TOO MUCH TIME ON ANY ONE QUESTION.
READ THE QUESTIONS CAREFULLY.

Knott's Mathematical Tables will be provided. Slide rules are NOT permitted.

This examination consists of THREE SECTIONS.

SECTION A is to be attempted by all students. (Questions 1 to 29)

SECTION B is to be attempted only by those students using the textbook Calculus. (Questions 30 to 53)

SECTION C is to be attempted only by those students using the textbook Vectors and Matrices. (Questions 54 to 79)

Your score on this test will be determined by the number of correct answers.
There will be no deduction for wrong answers.

LB
3054
C2
D419
1969a
math.31
CURR HIST

To ensure accuracy in the handling of your examination papers, the following sections on your ANSWER SHEET MUST BE COMPLETED.

SECTION A — Supply information as requested.

SECTION B — Labels will not be provided for the August examinations. Therefore disregard the box re label.

Indicate your name, mailing address and birth date in the space provided.

SECTION C — Supply information as requested.

SECTION D — Disregard this section.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE TEST BOOKLET.

Your presiding examiner will collect the answer sheet and booklet separately for transmission to the Department.

This Paper Is Protected by the Copyright Laws of Canada.

All questions will be machine-scored. Each question has four suggested answers, one of which is correct. Select the correct answer and record it on the separate ANSWER SHEET as shown in the example below.

EXAMPLE

1. The exact value of tan 45° is

ANSWERS

A. 0
B. 1
C. $\sqrt{3}$
D. 0.7

ANSWER SHEET

A [✓ B] C D E

DISREGARD COLUMN "E"
ON ANSWER SHEET

Mark your answer sheet using an ordinary HB pencil. Make sure your marks are heavy and clear. If you change your mind about an answer, be sure to erase your first mark completely. MARK ONLY ONE CHOICE FOR EACH QUESTION.

SECTION A

QUESTIONS 1 - 29 TO BE DONE BY ALL STUDENTS.

1. The exact value of ctn 315° is

A. $-\sqrt{3}$
B. -1
C. $\frac{-\sqrt{3}}{3}$
D. 1

2. Expressed in radian measure, 900° is

A. $\frac{(900(180)}{\pi}$
B. 5π
C. $\frac{10\pi}{9}$
D. $\frac{81,000}{\pi}$

3. The period of $2y = 3 \sin \frac{x}{2}$ is

A. 360°
B. 1,440°
C. 180°
D. 720°

4. The value of csc 438° 41′ is

A. 1.600
B. 5.097
C. 1.0204
D. 1.0198

Ex libris
universitatis
albertaensis
QUAECUMQUE VERA

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

[OVER]

5. If sin $2A$ = cos $8A$, then one value of A is

A. 9°
B. 15°
C. 10°
D. 18°

6. The amplitude and period, respectively, of the function 2 cos $3x$ are

A. $\frac{1}{2}$, $\frac{2\pi}{3}$
B. 2, $\frac{2\pi}{3}$
C. $\frac{1}{2}$, $\frac{\pi}{3}$
D. 2, $\frac{3\pi}{2}$

7. If $\sec(90° - A) = \frac{5}{3}$, then sin A equals

A. $\frac{5}{3}$
B. $\frac{4}{5}$
C. $\frac{5}{4}$
D. $\frac{3}{5}$

8. An equivalent expression for $\cos(x + y) - \cos(x - y)$ is

A. $2\sin x \sin y$
B. $-2\sin y \sin x$
C. $2\sin x \cos y$
D. $2\cos x \sin y$

9. The maximum value of $3 \sin 5x$ is

A. 3
B. 72
C. 1.667
D. 5

10. If $(4 \cos \theta - 2)(\cos \theta - 2) = 0$, then ONE value of θ is

A. 120°
B. 240°
C. 60°
D. 30°

11. If the slope of a line is $\frac{3}{5}$, then the angle of depression of the line is

A. 30° 57′
B. 210° 58′
C. 59° 2′
D. 30° 58′

LIBRARY
UNIVERSITY OF ALBERTA

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

12. The exact value of $\dfrac{\sec^2 45° + 2 \cos 60°}{\csc^2 30° - \sin 30°}$ is

A. 2
B. $\dfrac{4 + 2\sqrt{3}}{3}$
C. $2\dfrac{3}{5}$
D. $\dfrac{6}{7}$

13. An equivalent expression for $\dfrac{(\sin x + \sin y)}{2}$ is

A. $\cos \dfrac{x + y}{2} \cos \dfrac{x - y}{2}$
B. $\sin \dfrac{x + y}{2} \cos \dfrac{x - y}{2}$
C. $\sin \dfrac{x + y}{2} \sin \dfrac{x - y}{2}$
D. $\dfrac{\sin (x + y) \cos (x - y)}{4}$

14. If $\sin B = \dfrac{7}{25}$ and ctn B is positive, then $\cos B$ equals

A. $\dfrac{7}{25}$
B. $\dfrac{23}{25}$
C. $\dfrac{24}{25}$
D. $\dfrac{14}{25}$

15. If a wheel has an angular velocity of $\dfrac{20}{3}\pi$ radians per second, then its rate in revolutions per minute is

A. 200
B. 400π
C. $\dfrac{\pi}{9}$
D. $\dfrac{\pi}{18}$

16. The expression $\dfrac{\sin^2 A}{1 - \cos A}$ in simplified form is

A. $1 - \cos A$
B. $\operatorname{ctn} A \sin A$
C. $1 + \cos A$
D. $1 - \operatorname{ctn} A \csc A$

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

[OVER]

17. A point on the rim of a wheel moves with a velocity of 150 ft./sec. If the diameter of the wheel is 20 ft., the angular velocity of the point in radians per second is

A. 15
B. 150
C. 15π
D. 7.5

18. As a function of θ, $\cos(\theta - \pi)$ is

A. $-\cos\theta$
B. $\cos\theta$
C. $\sin\theta$
D. $-\sin\theta$

19. An equivalent expression for $\cos\theta$ is

A. $\pm\sqrt{\dfrac{1+\cos\theta}{2}}$

B. $2\cos^2\dfrac{\theta}{2} + 1$

C. $2\cos^2\dfrac{\theta}{2} - 1$

D. $1 - \sin^2\dfrac{\theta}{2}$

20. $\text{Sin}(\theta + 30°) + \cos(\theta + 60°)$ is equivalent to

A. $\sin\theta$
B. 0
C. $\sqrt{3}\sin\theta + \cos\theta$
D. $\cos\theta$

21. An equivalent expression for $\tan^2 B - \sin^2 B$ is

A. $\sin^4 B\cos^2 B$
B. $\sin^2 B\tan^2 B$
C. $-(\sec^2 B + \sin^2 B)$
D. $\csc^4 B\sec^2 B$

22. The area in square inches of triangle RMN when $r = 10$ inches, $m = 6$ inches, and $N = 60°$ is

A. $15\sqrt{3}$
B. 15
C. 30
D. $30\sqrt{3}$

23. The value of ctn $\left[\text{Arc tan}\left(\dfrac{2}{3}\right) + \text{Arc tan}\left(\dfrac{1}{2}\right)\right]$ is

A. $\dfrac{4}{7}$

B. $\dfrac{8}{7}$

C. -8

D. -4

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

24. The solutions for the equation $\sin 4x + \sin 2x = 0$, $0° \leqq x < 180°$, are

A. 0°, 60°, 90°, 120°, 150°
B. 0°, 60°, 90°, 120°, 180°
C. 0°, 30°, 60°, 90°, 120°
D. 0°, 60°, 90°, 120°

25. The measure of the largest angle in a triangle with sides 9, 10 and 11 units long is

A. 70° 40′
B. 70° 32′
C. 58° 59′
D. 50° 28′

26. A regular pentagon is inscribed in a circle whose diameter is 20 inches. The length in inches of the perpendicular from the center of the circle to one side of the pentagon is

A. 11.756
B. 10
C. 16.180
D. 8.090

27. A 12 sided regular polygon is inscribed in a circle with radius 10 inches. The area in square inches of the region bounded by the circle and outside the regions bounded by polygon is

A. $\frac{25}{3}(\pi - 3)$
B. $25(2\pi - 1)$
C. $100(\pi - 3)$
D. $10(\pi - 3)$

28. A pole which leans 5° from the vertical toward the sun, casts a shadow 40 ft. long. If the angle of elevation of the sun is 45°, then the length of the pole in feet is

A. $40 \sin 85°$
B. 40
C. $80 \sin 35°$
D. $40\sqrt{2}$

29. In solving the equation

$\text{Arc}\cos 2x + \text{Arc}\cos x = \text{Arc}\cos \frac{1}{2}$, an equivalent equation is

A. $3x^2(4x^2 - 1) = 0$
B. $x^2 = 0$
C. $4x^2 - 1 = 0$
D. $12x^4 - 16x^2 + 3 = 0$

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

This concludes SECTION A of the examination paper.
Students using the textbook *CALCULUS* proceed to SECTION B.

Students using the textbook *VECTORS AND MATRICES* proceed to SECTION C.

Students MUST NOT answer both sections B and C.

SECTION B — pages 14 to 21

You are to attempt ITEMS 30 through 53 only if you have been using the textbook *CALCULUS*.

If you are attempting this section DO NOT MARK ANY ANSWERS BEYOND ITEM 53.

CALCULUS — SECTION B

30. The slope of the secant of the graph of $y = 4x - x^3$ through the points where $x = 0$ and $x = 1$ is

A. 1
B. 3
C. $\frac{1}{3}$
D. −3

31. A car is driven for 3 hours at 45 m.p.h. and then for 5 hours at 65 m.p.h. Its average velocity over the total distance is

A. 55 m.p.h.
B. 57.5 m.p.h.
C. 57 m.p.h.
D. 60 m.p.h.

32. The velocity v ft sec at any time t sec when $t \geqq 0$ if the distance s ft is given by $s = 10 - 4t + 5t^2 - t^3$ is indicated by v equals

A. 10
B. $-4 + 10t - 3t^2$
C. $10 - 6t$
D. $10t - 2t^2 + \frac{5}{3}t^3 - \frac{1}{4}t^4$

33. If $Sn = \frac{a(1 - r^n)}{1 - r}$, the sum of the infinite geometric series

$3 + 1 + \frac{1}{3} + \frac{1}{9} + \ldots$ is

A. 5
B. $\frac{9}{2}$
C. $\frac{40}{9}$
D. ∞

34. Which one of the following is a rational algebraic function?

A. $\frac{\sin x}{\cos x + 1}$
B. $1 + 10^x - 10^{2x}$
C. $x^2 + \frac{1}{x} + \frac{1}{x}2$
D. $\sqrt{x^2 + 2x + 4}$

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

[OVER]

35. The family of curves which has a slope given by $x^{\frac{1}{2}} + 2$ is

A. $y = \dfrac{x^{-\frac{1}{2}}}{2} + 2x + c$

B. $y = x^{\frac{1}{2}} + c$

C. $y = \dfrac{x^{-\frac{1}{2}}}{2} + c$

D. $y = \dfrac{2x^{\frac{3}{2}}}{3} + 2x + c$

36. The equation of the tangent to the curve of $y = 2x^2 + 3x - 5$ at the point where $x = -1$ is

A. $y = 4x + 3$
B. $y = -x - 7$
C. $y = -\dfrac{3}{4}x - \dfrac{27}{4}$
D. $y = 2x - 2$

37. A point where the graph of $y = x^3 - 4x^2 + 4x - 3$ has zero slope is

A. (2, −3)
B. (2, 0)
C. (−3, 2)
D. (0, −3)

38. The maximum value of the distance given by $s = 3 - 9t + 6t^2 - t^3$ when $t \geqq 2$ is

A. −1
B. 6
C. 1
D. 3

39. The limit of $\dfrac{3x^3 - 2x^2 + 5x}{x^2 - x}$ as $x \to 0$ is

A. 6
B. −5
C. 0
D. ∞

40. The derivative with respect to x of $y = x\sqrt{1 - x^2}$ is

A. $\dfrac{1}{2}x(1 - x^2)^{-\frac{1}{2}} + (1 - x^2)^{\frac{1}{2}}$

B. $-x^2(1 - x^2)^{-\frac{1}{2}} + (1 - x^2)^{\frac{1}{2}}$

C. $-x(1 - x^2)^{-\frac{1}{2}}$

D. $x - x(1 - x^2)^{\frac{3}{2}}$

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

41. The derivative of y with respect to x for a function determined by $2x^2 + 3xy - y^2 = 20$ is

A. $\dfrac{-(4x + 3y)}{(3x - 2y)}$

B. $\dfrac{4x + 3y}{3x - 2y}$

C. $4x + 3 - 2y$

D. $-7x - y$

42. The value of y, if $D_xy = 2x^3(x + 5)$, is

A. $\dfrac{x^4}{2}\left(\dfrac{x^2}{2} + 5x\right) + c$

B. $8x^3 + 30x^2 + c$

C. $\dfrac{2}{5}x^5 + \dfrac{5}{2}x^4 + c$

D. None of these

43. The area of the region bounded by the graph of $y = \dfrac{1}{x^3}$, the x – axis and the lines with equations $x = 1$ and $x = 3$ is

A. 240

B. $\dfrac{4}{9}$

C. $\dfrac{26}{27}$

D. 20

44. An equation of a tangent to the graph of $y = 3x + \dfrac{1}{x}$ is parallel to the graph of $y = -x + 6$ is

A. $y = 3 - \dfrac{1}{x^2}$

B. $y = -x + 7\sqrt{\dfrac{1}{3}}$

C. $y = -x + 4$

D. $y = x + 4$

45. A local maximum value of $y = x^3 + 3 + \dfrac{3}{x}$ is

A. 7
B. 3
C. −1
D. 1

46. A rectangular field is to be enclosed by a fence and divided into two smaller plots by a fence parallel to one of the sides. The dimensions in feet of the largest such field if 1200 feet of fence is available is

A. 150 × 350
B. 200 × 600
C. 300 × 300
D. 200 × 300

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

47. A point of inflection on the graph of $y = 2x^{\frac{1}{3}} + x^{\frac{4}{3}}$ is

A. (0, 0)
B. (8, 20)
C. (1, 3)
D. There is no point of inflection

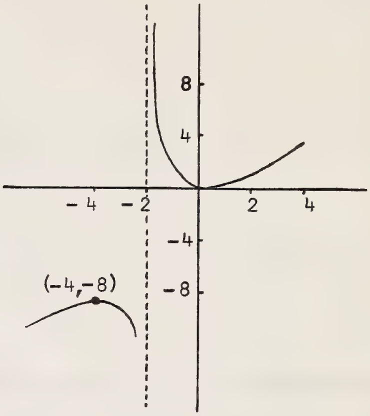
48. The equation of this graph is

A. $y = \dfrac{x^2}{x + 2}$

B. $y = \dfrac{x^2}{(x + 2)^2}$

C. $y = \dfrac{x}{x^2 - 4}$

D. $y = \dfrac{x}{x + 2} + x$



49. The equation of the curve that has a slope given by $x^2 - 4x + 1$ and passes through the point (0, 3) is

A. $y = x^3 - 6x^2 + 3x + 9$

B. $y = x^3 - 6x^2 + 3x + 3$

C. $y = \frac{1}{3}x^3 - 2x^2 + x + 1$

D. $y = \frac{1}{3}x^3 - 2x^2 + x + 3$

50. The formula for the distance, giving the distance in terms of time, if $v = 2 - t^{-2}$ and $s = 5$ when $t = 1$ is

A. $s = 2t + t^{-1}$

B. $s = 2t + \dfrac{1}{t} + 2$

C. $s = 2t + t^{-1} + 5$

D. $s = 2t^{-3} + 3$

51. A cube is expanding in such a way that its edge is changing at a rate of 5 in./sec. When its edge is 4 inches long, the rate of change of its volume is

A. 192 in^3/sec
B. 48 in^3/sec
C. 375 in^3/sec
D. 240 in^3/sec

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

[OVER]

52. The area of the region enclosed by the graphs of $y = x^2$ and $y = x + 6$ is

A. $\frac{35}{3}$

B. $\frac{215}{3}$

C. $\frac{125}{6}$

D. $\frac{265}{6}$

53. A truck rolls down a slope inclined 30° to the horizontal so that its constant acceleration due to gravity is 32 sin 30°. If the truck starts to roll from rest its speed when it has rolled 1000 feet is

A. $5\sqrt{5}$ ft./sec.

B. $80\sqrt{5}$ ft./sec.

C. $80\sqrt{10}$ ft./sec.

D. 120 m.p.h.

END OF SECTION B

Students using textbook *CALCULUS* have now completed the examination,

and are NOT to fill in spaces past number 53 on the separate answer sheet.

SECTION C — pages 24 to 32

This section is to be attempted ONLY by those students using the textbook *VECTORS AND MATRICES*. Be very careful to mark in the spaces opposite the correct question numbers on the separate answer sheet. You will fill in the spaces opposite numbers 54 through 79 on the separate answer sheet.

DO NOT ATTEMPT any questions in this section if the previous SECTION B has already been attempted.

VECTORS AND MATRICES — SECTION C

54. Which of the following pairs of vectors are parallel?

A. (1, 5), (4, 1)
B. (6, 3), (2, 1)
C. (5, 2), (2, 4)
D. (5, 1), (4, 1)

55. Because the solution set of $\begin{cases} x + 3y - 5z = 0 \\ 2x + y - 6z = 0 \end{cases}$

is $\left\{\left(\frac{13}{5}k,\ \frac{4}{5}k,\ k\right) \middle|\ k \in Re\right\}$

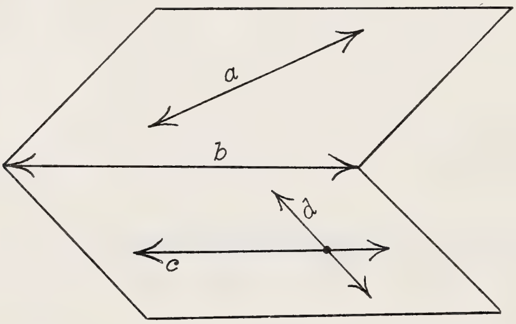
the above system is said to be

A. inconsistent
A. independent
C. dependent
D. unique

56. An example of a vector is

A. a direction
B. temperature
C. 20 lbs
D. 20 lbs force due south

57. The drawing below represents two planes that intersect and contain the indicated lines. A pair of lines which are skew lines is



A. a and b
B. a and d
C. b and c
D. b and d

58. In order for the pair of vectors (4, –5), (8, k) to be collinear k must have a value of

A. –10
B. 2
C. –2
D. 10

59. What algebraic vector corresponds to the geometric vector $\overrightarrow{PQ}$ if $P(4, 1, 0)$, $Q(-1\ -5, -4)$?

A. (–5, –6, –4)
B. (5, 6, 0)
C. (3, 4, –4)
D. (5, 6, 4)

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

[OVER]

60. Which set of two vectors forms a basis for V_2 ?

A. (2, –3), (4, –6)
B. (1, 1), (3, 5)
C. (2, 0), (4, 0)
D. (–1, 2), (–3, 6)

61. If it is given that **u** = (2, –3), **v** = (4, 6) and **w** = (–1, 5), then the value of **w** • (**u** + **v**) is

A. (–6, 15)
B. 9
C. –27
D. (5, 8)

62. The angle between the vectors, **u** = (5, –1) and **v** = (4, 8), has a cosine of

A. $\dfrac{7\sqrt{130}}{130}$
B. $\dfrac{3\sqrt{520}}{520}$
C. $\dfrac{3\sqrt{130}}{130}$
D. $\dfrac{\sqrt{30}}{20}$

63. If it is given that $A = \begin{bmatrix} 4 & -1 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -5 & -7 \\ 3 & 1 \end{bmatrix}$, then the value of $2A - 3B$ is

A. $\begin{bmatrix} 23 & 19 \\ -7 & 3 \end{bmatrix}$
B. $\begin{bmatrix} -1 & -8 \\ 4 & 4 \end{bmatrix}$
C. $\begin{bmatrix} -12 & -36 \\ 4 & 12 \end{bmatrix}$
D. $\begin{bmatrix} -36 & -12 \\ 12 & 4 \end{bmatrix}$

64. If $A = [a_{ij}] = \begin{bmatrix} 5 & -7 \\ 2 & 4 \end{bmatrix}$ and $B = [b_{ij}] = \begin{bmatrix} -1 & 0 \\ 6 & 3 \end{bmatrix}$

then $a_{21}b_{11} + a_{12}b_{22}$ equals

A. –23
B. 64
C. 32
D. 20

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)

65. A matrix row equivalent to the given matrix $\begin{bmatrix} 5 & -1 \\ 3 & 7 \end{bmatrix}$ is

A. $\begin{bmatrix} 7 & -1 \\ 3 & 5 \end{bmatrix}$

B. $\begin{bmatrix} 10 & -2 \\ 7 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 6 & 14 \\ 5 & -1 \end{bmatrix}$

66. The solution set of a system having the following row-reduced echelon form of augmented matrix is $\left[\begin{array}{cc|c} 1 & 4 & -2 \\ 0 & 1 & 5 \end{array}\right]$

A. {(–7, 5)}
B. {(–22, 5)}
C. {(22, –5}
D. inconsistent

67. In which of the following triplets of vectors are the vectors coplanar?

A. (1, 0, 6), (1, 2, –1), (3, 0, 4)
B. (3, 2, –1), (6, –4, 2), (1, 1, 1)
C. (1, 1, 2), (3, –1, 1), (4, 2, 2)
D. (3, 0, 0), (1, 0, 5), (1, 0, 0)

68. What are values of a and b if $6(a, 1) - 4(2, b) = (2, 1)$?

A. $a = 2,\ b = 1$

B. $a = \frac{1}{3},\ b = -\frac{1}{4}$

C. $a = \frac{5}{3},\ b = \frac{5}{4}$

D. $a = \frac{2}{3}b$

69. Which of the following pairs of coplanar vectors are collinear?

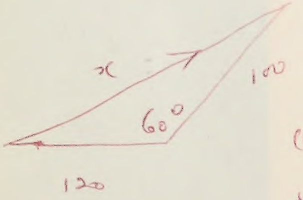
A. (4, –2), (2, 1)
B. (2, 4), (1, –2)
C. (0, 2), (2, 0)
D. (4, –2), (–2, 1)

70. Two vectors **u** and **v** have a common initial point and form an angle of 120°. If $|\mathbf{u}| = 120$ and $|\mathbf{v}| = 100$, the value of $|\mathbf{u} + \mathbf{v}|$ is

A. $20\sqrt{91}$
B. 12400
C. $20\sqrt{31}$
D. 36400

FOR COMPUTATIONS AND ROUGH WORK

(No marks will be assigned for work in this booklet)



$(100)^2 + (120)^2 + 2(120)(100)\cos 60^\circ$

12000

$$\begin{array}{r} 10000 \\ 14400 \\ 12000 \\ \hline 36400 \end{array}$$

71. The magnitude of the equilibrant of two forces $F_1 = 7$ lbs and $F_2 = 5$ lbs acting at right angles to each other is

A. $-\sqrt{74}$ lbs
B. $2\sqrt{6}$ lbs
C. 12 lbs
D. $\sqrt{74}$ lbs

72. $\overrightarrow{OP}$, $\overrightarrow{OQ}$, $\overrightarrow{OR}$ are three mutually perpendicular vectors.

If $\overrightarrow{OP} = 2\mathbf{u}$, $\overrightarrow{OQ} = 3\mathbf{v}$ $\overrightarrow{OR} = 4\mathbf{w}$ and $|\mathbf{u}| = 3$, $|\mathbf{v}| = 4$, $|\mathbf{w}| = 5$ then the value of $|\overrightarrow{OP} + \overrightarrow{OQ} + \overrightarrow{OR}|$ is

A. $\sqrt{50}$
B. 38
C. $\sqrt{38}$
D. $2\sqrt{145}$

73. The equation of a plane parallel to the plane having equation $x + 3y + 6z = 5$ is

A. $2x + 6y + 11z = 10$
B. $x + 3y - 6z = 5$
C. $3x + 9y + 18z = 6$
D. $2x + 3y + 12z = 12$

74. If the transformation T is given by $T \begin{cases} u = -x + 6y \\ v = 2x - 12y \end{cases}$

find the set of points whose image under T is the point $(20, -40)$

A. $\{(4k - 14, k) \mid k \in Re\}$
B. $\{6k - 20, k) \mid k \in Re\}$
C. $\{(20 - 6k, k) \mid k \in Re\}$
D. $\{(20, -40)\}$

75. If possible, the matrix of the inverse of the transformation

$T \begin{cases} u = 2x + y \\ v = 4x + y \end{cases}$ is

A. $T^* = \begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ 2 & -1 \end{bmatrix}$

B. No inverse is possible.

C. $T^* = \begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ 2 & -1 \end{bmatrix}$

D. $T^* = \begin{bmatrix} 2 & 1 \\ 4 & 1 \end{bmatrix}$

LB 3054 C2 D419 1969A MATH-31
DEPARTMENTAL EXAMINATIONS GRADE
12 1969 AUGUST --

39780803 CURR HIST

000016283178

COMPUTATIONS AND ROUGH WORK

ks will be assigned for work in this booklet)

LB 3054 C2 D419 1969a math.31
Departmental examinations,
[grade 12] 1969, August. -

39780803 CURR HIST

[OVER]

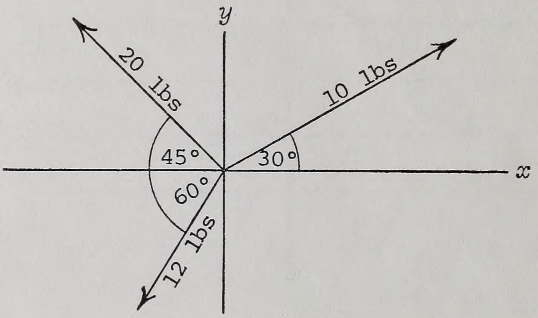
76. The solution of the system $\begin{cases} -x + 3y = 2 \\ 3x - 9y = -6 \end{cases}$ in parametric form is

A. $x = 3k - 2,\ y = k$
B. (1, 1)
C. $x = 3k + 2,\ y = k$
D. (–2, 0)

77. The co-ordinates of the vertices of a triangle are
$P(-1, 3, 2)$, $Q(3, -2, 4)$ $R(5, -2, 0)$.
Which of the following is correct?

A. There is a right angle at P.
B. There is a right angle at R.
C. There is a right angle at Q.
D. There is no right angle.

78. If F lbs is the y-component of the resultant of three coplanar forces acting at a point O as shown in the diagram, then F in lbs is



A. $10\sqrt{2} + 5 - 4\sqrt{3}$
B. $10\sqrt{2} - \sqrt{3}$
C. $10\sqrt{2} + 5 - 6\sqrt{3}$
D. $10\sqrt{2} - 1$

79. A load is pulled up an inclined plane having a slope of $\frac{1}{7}$. The magnitude (lbs) and direction of the force exerted is represented by the vector (9, 12) lbs. If the component of this force that pulls the load up the inclined plane is F lbs, then F in lbs is

A. $\dfrac{51}{\sqrt{50}}$

B. 5

C. $\dfrac{15\sqrt{2}}{2}$

D. 9